U. S. DEPARTMENT OF AGRICULTURE
WEATHER BUREAU :: WASHINGTON, D. C.

Instructions for Airway Observers

CIRCULAR N, AEROLOGICAL DIVISION
First Edition :: :: :: :: *1928*

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U. S. DEPARTMENT OF AGRICULTURE
WEATHER BUREAU

INSTRUCTIONS

FOR

AIRWAY OBSERVERS

CIRCULAR N, AEROLOGICAL DIVISION

[*First Edition*]

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CONTENTS

ILLUSTRATIONS

INSTRUCTIONS FOR AIRWAY OBSERVERS

INTRODUCTION

The object of this pamphlet is to furnish airway observers with brief instructions for their guidance in installing the necessary equipment and taking, recording, and transmitting such weather observations as are necessary for the successful operation of airways. Pilots and operators are to a large extent dependent on these weather reports for the safe operation of their aircraft. Therefore, the need of accurate observations and prompt reports is self-evident.

It is the object to make this pamphlet as complete as is now possible, to explain the use of every instrument used in the work, and to make rules for taking observations in any portion of the country and under any circumstances. At some stations the instrumental equipment will be less complete than at others. For example, not all stations will be supplied with barometers and anemometers. These instructions, however, are uniform and cover all features of the work. Only those portions that apply to the observations of an individual station need be studied in detail by the observer at that station.

Officials in charge of Weather Bureau offices and of airport weather stations and their assistants, as well as the airway observers, will familiarize themselves with these instructions in order that all messages may be clear and uniform, regardless of their source.

In some cases the observer will file his message at stated times every day; in other cases the observer will telegraph or telephone or otherwise transmit his observation on call from the airport that desires it.

Correspondence relative to the work of the airway station, instruments, forms, etc., will generally be had with the Weather Bureau office under whose supervision the work is conducted and with the superintendent of lighthouses of the district in which the station is located. Correspondence will also occasionally be had with the meteorologist in charge at the city airport or terminal to which the reports are transmitted by telegraph, telephone, or radio. Blank forms and franked envelopes are furnished free of expense to the observers. Instructions for the mailing of forms will be found further on in this pamphlet.

I. GENERAL DUTIES

1. Select some spot from which you can see conditions in all directions. Always stand near this spot when making observations.

2. Determine actual distance from this spot to certain objects such as church steeples, barns, hills, beacon lights, etc. Use these and

other objects of known distance from station for estimating various degrees of visibility as explained further under Chapter IV (Visibility).

3. Ten minutes before time of report enter all observations on Airway Observer's Weather Report Form No. 1130–Aer., Weather Bureau, or Form 64, Lighthouse Service. (These forms are practically identical and will be used by the observers employed by these two services respectively.)

4. Make two copies of each report, using carbon and a sharp pencil.

5. Write time of observation in time column and indicate whether a. m. or p. m.

6. Use new report blanks each Monday morning. Mail reports of previous week promptly. Be sure to enter all weather data.

II. OBSERVING GENERAL WEATHER CONDITIONS

1. Look around you in all directions.

2. Note the general character of the sky and the present state of the weather, and enter in column headed "General conditions."

3. If the sky has only a few clouds visible, report as "Clear."

4. If more than a few clouds are present, but half or less of the sky is covered, report as "Scattered clouds."

5. If more than half of the sky is covered, but not entirely overcast, report as "Broken clouds."

6. If approximately all of the sky area is covered, report as "Overcast."

7. Look for local storms by watching the threatening sky, lightning flashes, and listening for thunder.

8. Watch direction from which storm is coming.

9. If you think storm will reach your station, report as "Thunderstorm approaching from ———," giving its direction from your station.

10. If you do not think storm will reach your station, report as "Thunderstorm passing," giving its direction from your station, and direction toward which it is moving.

11. If lightning is visible, but no thunder heard, report as "Lightning in ———," giving direction from station where lightning appears.

12. Other entries in the "General conditions" column will be as follows:

"Light rain," when there is a steady fall of light amount.

"Heavy rain," when fall is faster.

"Light snow."

"Heavy snow."

"Snow flurries," when fall is intermittent.

"Light hail."

"Heavy hail."

"Freezing rain," when rain is falling, but freezing upon striking any object.

"Sleeting," when sleet, which is composed of ice pellets, is falling. Sleet is distinguished from hail in that it is smaller, and occurs only during the cold season. It should not be confused with the phenomenon of freezing rain.

"Light fog," when a fog with a visibility of only about one-half mile is present.

"Dense fog," when a fog of a denser character is observed, and visibility is less than 1,000 feet.

"Ground fog," when a fog obscures objects on the ground, but does not materially obscure the sky or stars.

"Haze," when a dusty or milky-white coloring is prominent in the sky and holds visibility down.

Combinations and modifications of the above states of weather occur often, and should be reported, such as "Light rain and haze," "Freezing rain and sleeting," "Rain and hail," "Clearing in west," etc.

When the weather is so unsettled that it is changing from moment to moment, report "Weather changeable."

When a heavy amount of rain or snow has fallen since the previous observation, even though rain or snow is not falling at the time of the current observation, this should likewise be recorded, and reported in the message.

III. CEILING (DAYTIME)

1. Estimate height of base of lowest clouds, and enter on report form to the nearest 100 feet. If "broken clouds" or "overcast" sky is reported, the height of ceiling should be given. Whenever possible, use altitude points on neighboring hills to aid in determining daytime ceiling, by observing whether cloud layers extend down to cover these points.

2. When sky is overcast sufficiently to make the day rather dark, it is sometimes possible to use the ceiling light, as explained in instructions under III–A for nighttime observation.

DISTINGUISHING CLOUD TYPES

A brief study of the cloud charts, Figures 1 to 12, and the description of the cloud types that follow, together with the table of average cloud heights included here, will be of considerable aid to the observer in estimating height of ceiling.

Cirrus (Ci.).—Detached clouds of delicate and fibrous appearance, often showing a featherlike structure, generally of a whitish color. Cirrus clouds take the most varied shapes, such as isolated tufts, thin filaments on a blue sky, threads spreading out in the form of feathers, curved filaments ending in tufts, etc.

Cirro-stratus (Ci.-St.).—A thin whitish sheet of clouds sometimes covering the sky completely and giving it only a milky appearance, at other times presenting, more or less distinctly, a formation like a tangled web. This sheet often produces halos around the sun and moon.

Cirro-cumulus (Ci.-Cu.).—Sometimes called mackerel sky. Small globular masses or white flakes without shadows, or showing very slight shadows, arranged in groups and often in lines.

Alto-stratus (A.-St.).—A thick sheet of gray or bluish color, sometimes forming a compact mass of dark gray color and fibrous structure. At other times the sheet is thin, resembling thick Ci.-St. and through it the sun or moon may be seen dimly as through ground glass.

FIG. 1.—Cirrus, tufted form

FIG. 2.—Cirrus merging into cirro-stratus

Alto-cumulus (A.-Cu.).—Large globular masses, white or grayish, partly shaded, arranged in groups or lines, and often so closely packed that their edges appear confused. The detached masses are generally larger and more compact (resembling St.-Cu.) at the center of the group, but the thickness of the layer varies. At times the masses spread themselves out in the form of small waves or curved plates.

Strato-cumulus (St.-Cu.).—Large globular masses or rolls of dark clouds often covering the whole sky, especially in winter. Sometimes

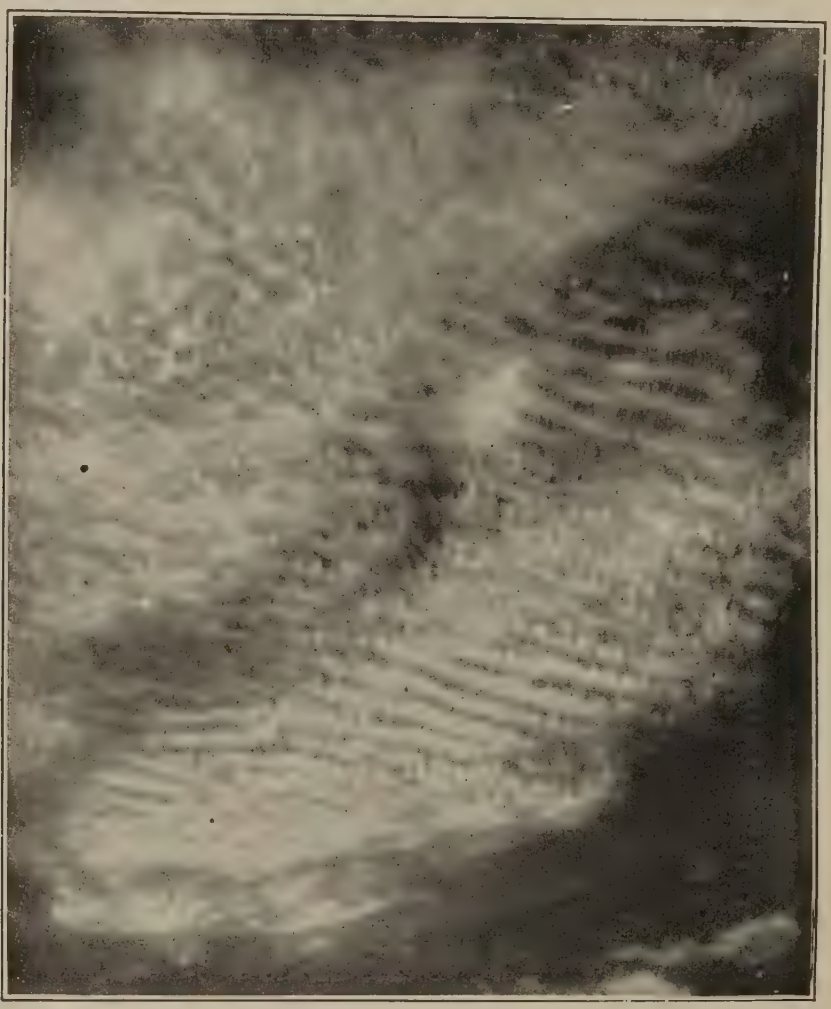

FIG. 3.—Cirro-cumulus, overhead

this cloud form presents the characteristic appearance of great rolls arranged in parallel lines and pressed up against one another. Blue sky may be seen through the intervening spaces, which are of a much lighter color. St.-Cu. clouds may be distinguished from Nb. by their globular or rolled appearance, and by the fact that they are not generally associated with rain.

Cumulus (Cu.).—Some times referred to as "woolpack clouds." Thick clouds of which the upper surface is dome shaped and exhibits protuberances, while the base is horizontal. These clouds appear to be formed by a diurnal ascensional movement of the air which is almost always noticeable. True cumulus has well defined upper and

FIG. 4. Alto-stratus, above a layer of fog

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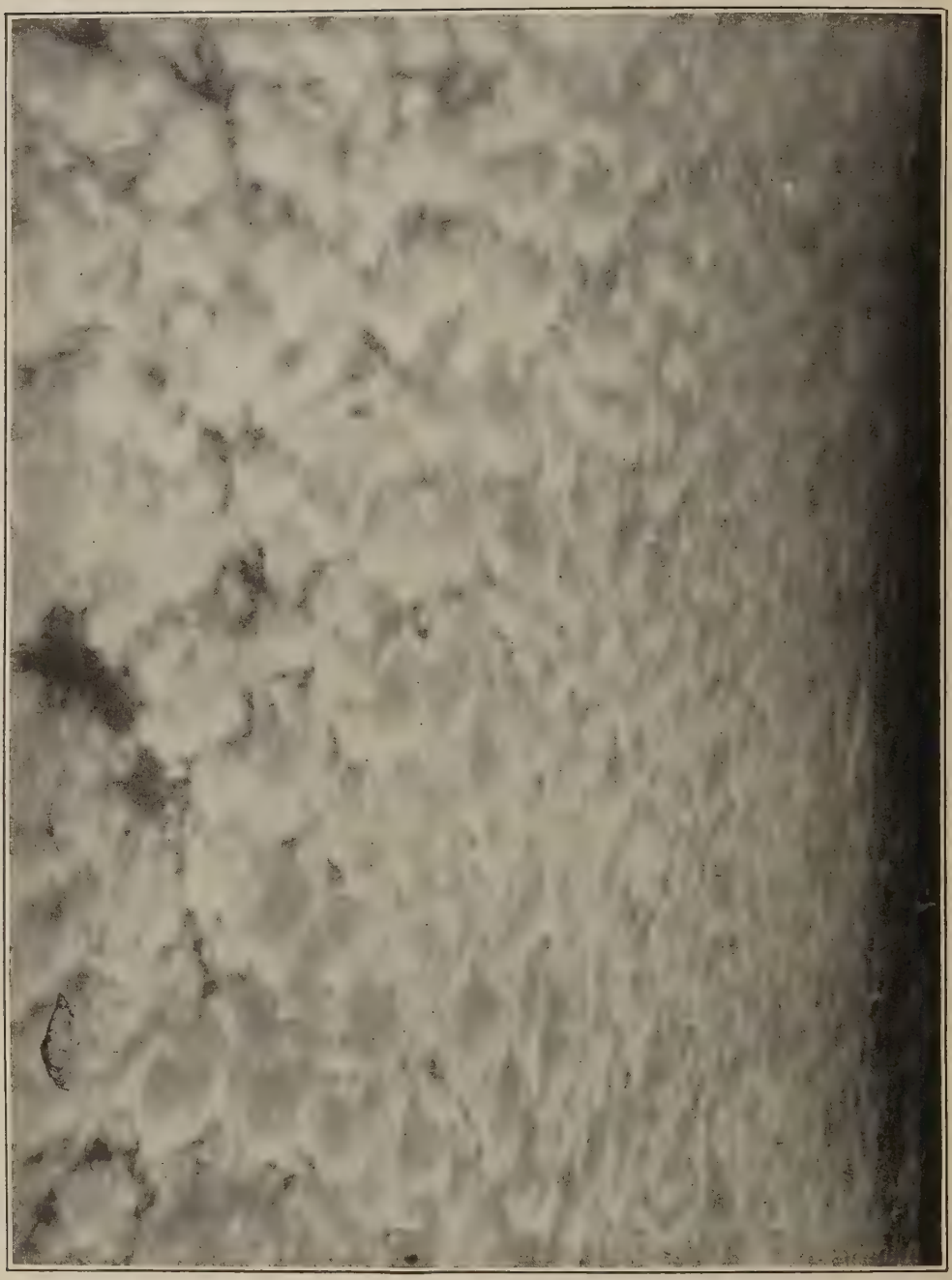

FIG. 5.—Alto-cumulus

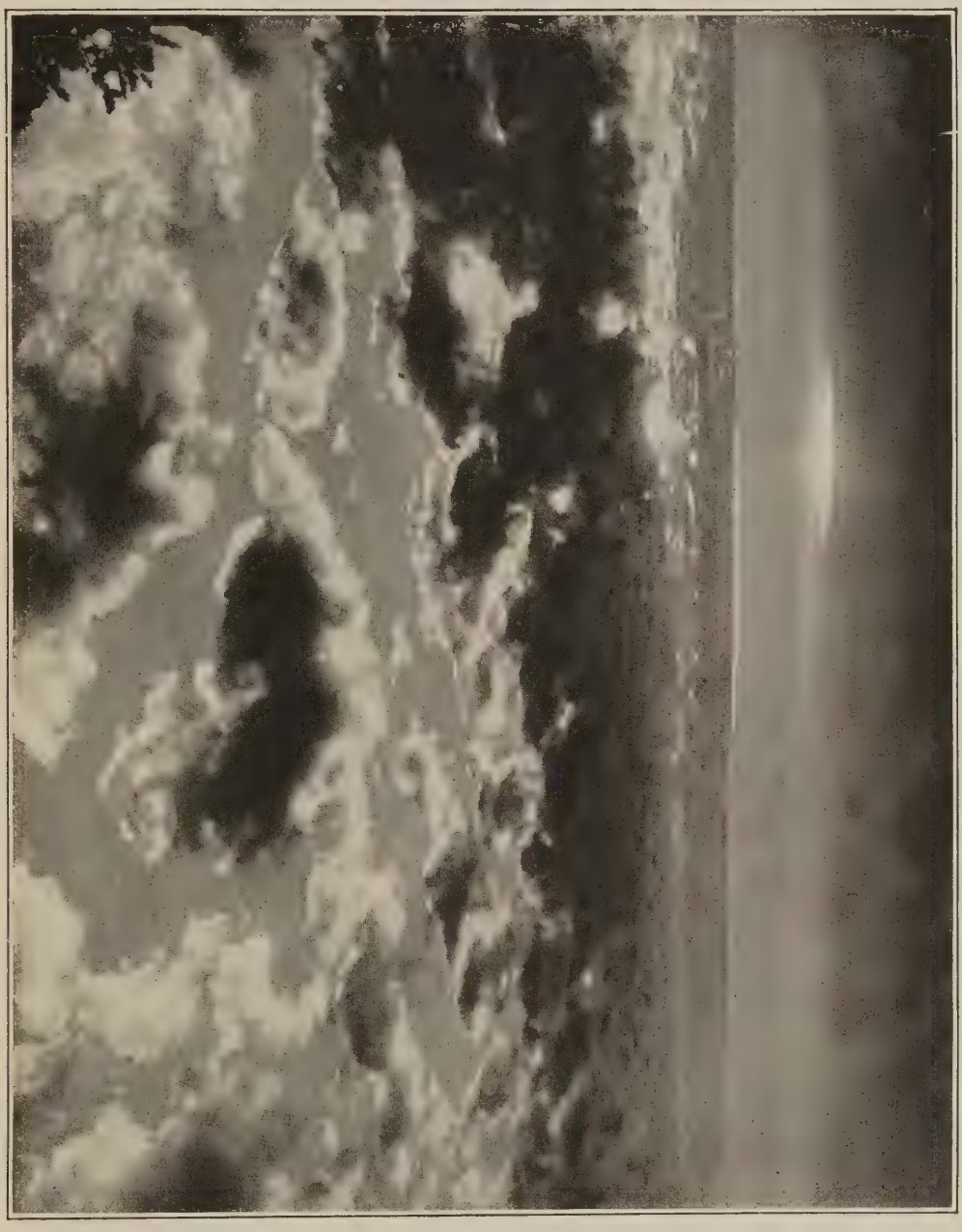

FIG. 6.—Strato-cumulus

FIG. 7.—Strato-cumulus rolls

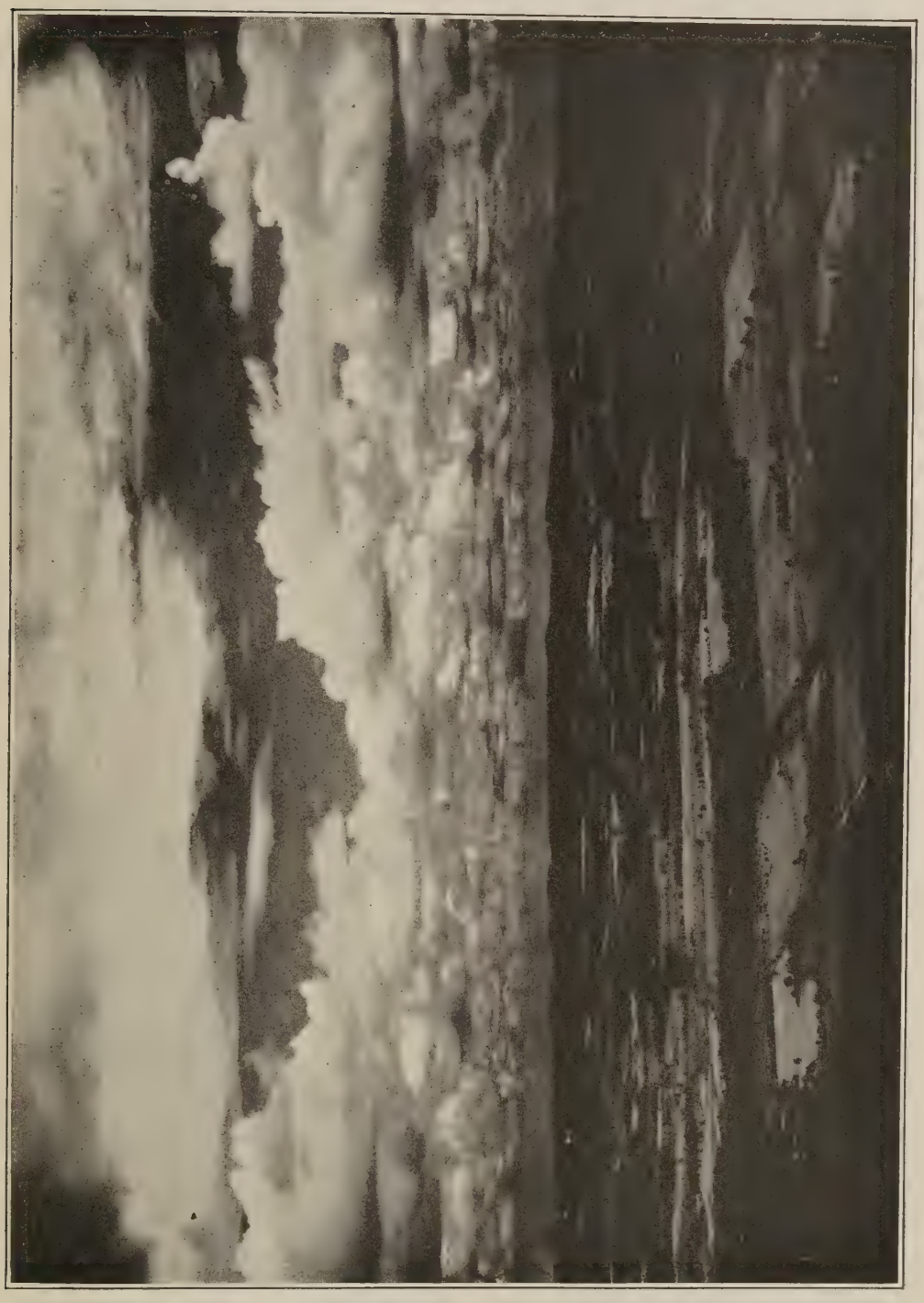

FIG. 8.—Cumulus and strato-cumulus below; thin alto-stratus above

FIG. 9.—Cumulus

FIG. 10.—Cumulo-nimbus

FIG. 11.—Nimbus, with fog below

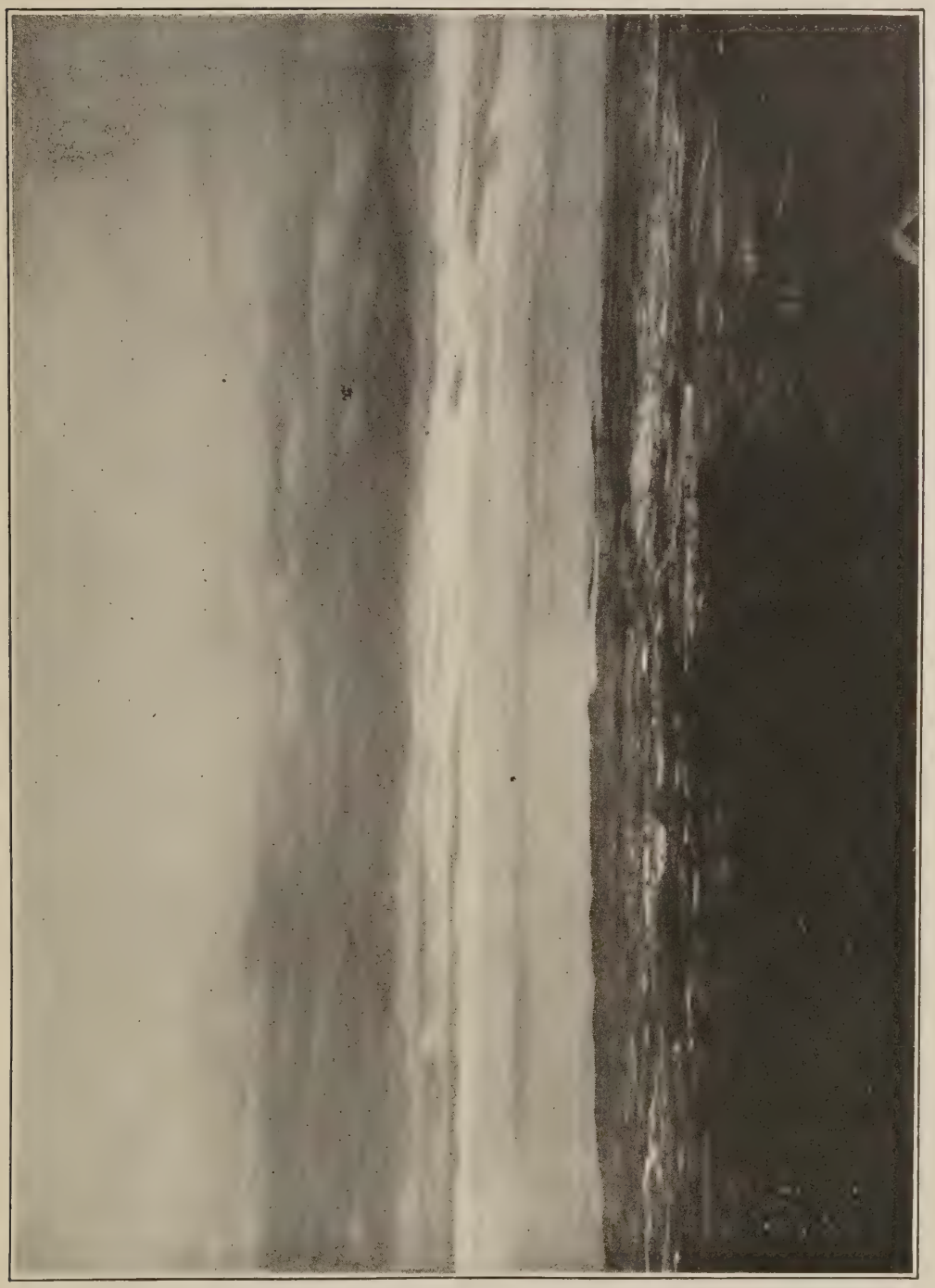

FIG. 12.—Stratus

lower limits, but in strong winds this cloud sometimes breaks and undergoes continual changes.

Cumulo-nimbus (Cu.-Nb.), *Thunder Cloud; Shower Cloud.*—Heavy masses of cloud rising in the form of mountains, turrets, or anvils, generally surmounted by a sheet or screen of fibrous appearance (false cirrus), and having at its base a mass of cloud similar to nimbus. From the base local showers of rain or snow (occasionally of hail or soft hail) usually fall. Sometimes the upper edges assume the compact form of cumulus, and form massive peaks around which delicate "false cirrus" floats.

Nimbus (Nb.), *Rain clouds.*—A thick layer of dark clouds without shape and with ragged edges, from which steady rain or snow usually falls. Through the openings in these clouds an upper layer of Ci.-St. or A-St. may be seen almost invariably.

Stratus (St.).—A uniform layer of cloud resembling a fog but not resting on the ground.

ESTIMATING CEILING FROM CLOUD TYPES

When any of the first three forms appear (Ci., Ci-St., and Ci.-Cu.) it can be safely assumed that the ceiling is unlimited, as the lowest possible altitudes of these types of clouds are well above the usual range of airplanes. This will also very often be the case with the next two forms classified, i. e., A.-St. and A.-Cu., although it will be noted that these clouds are sometimes as low as 2,500 to 4,000 feet.

It is sometimes hard to distinguish between A.-St. and St.; also there will sometimes be doubt as to whether a cloud is A.-Cu., St.-Cu., or Cu. In such cases it is better to err on the safe side, and consider the clouds as being of the lower type and estimate the height of their base accordingly.

Cu.-Nb. is usually a detached cloud, covering but a small portion of the sky. Its presence in the sky is therefore of importance not so much from the standpoint of ceiling, as that it often portends the occurrence or development of a thunderstorm. The nimbus is the rain cloud, and is nearly always low. The stratus base is also usually low, varying from a few hundred feet above the ground to a few thousand feet.

Height above ground of base of various types of clouds

Name of clouds	Summer (April–September)		Winter (October–March)	
	Range in height, feet	Usual height, feet	Range in height, feet	Usual height, feet
Cirrus	20, 000–40, 000	30, 000	20, 000–40, 000	30, 000
Cirro–stratus	20, 000–40, 000	30, 000	20, 000–40, 000	30, 000
Cirro-cumulus	10, 000–35, 000	22, 000	10, 000–35, 000	22, 000
Alto-stratus	8, 000–32, 000	20, 000	4, 000–32, 000	14, 000
Alto-cumulus	2, 500–28, 000	10, 000	5, 000–20, 000	10, 000
Strato-cumulus	500–12, 000	2, 000	500–12, 000	2, 000
Cumulus	1, 000–11, 000	5, 000	1, 200– 9, 000	4, 000
Nimbus	700–13, 000	800	700–12, 000	1, 000
Stratus	200– 6, 000	1, 000	200– 6, 000	1, 000

THE PILOT-BALLOON METHOD OF DETERMINING CEILING

Small balloons made of pure rubber, about the size of toy balloons, are used for this purpose, and inflated with hydrogen, the air being previously driven out of the balloon by rolling it toward the neck. The balloons are inflated to a definite free lift, which corresponds to a definite ascensional rate of the balloon. The free lift of the balloon is measured while it is being inflated, inflation being stopped as soon as the balloon lifts the required weight.

The usual method is to inflate the balloon on a simple set of scales, or—still simpler—to have the rubber tube and nozzle conveying hydrogen to the balloon of a certain fixed weight. As soon as the balloon is just able to balance the weight attached to it, inflation is complete, and the valve at the hydrogen cylinder is closed. If the inflation has progressed too far, and the balloon tends to lift the suspended weight, some hydrogen must be released by means of the

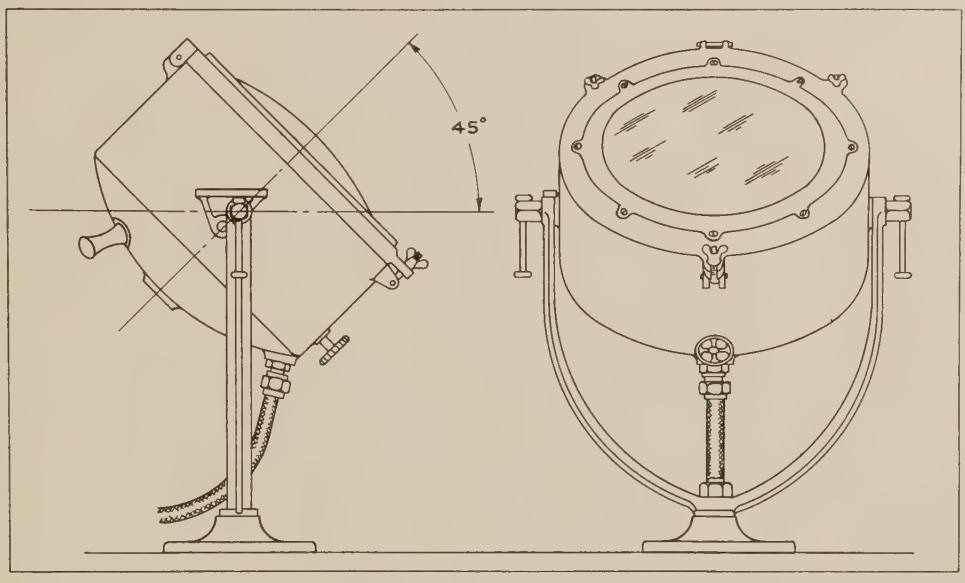

FIG. 13.—Ceiling light

pet cock at the nozzle until a state of balance is again reached. The neck of the balloon is then twisted and securely fastened with rubber bands.

The balloon is released on an even minute and watched until it disappears in the base of the clouds. The number of minutes and fractions thereof that the balloon is visible, multiplied by the ascensional rate of the balloon, is the height of the cloud base. Observers who are furnished this equipment will be advised as to the free lift to give the balloons and the ascensional rate that this corresponds to.

III–A. CEILING (NIGHTTIME)

1. Turn on ceiling light. (Fig. 13.)
2. If of the revolving type, swing it around in a circle so that all portions of the sky can be seen.
3. Pick out lowest cloud which the beam touches.
4. Walk in the direction of beam, pacing off distance as you go.

5. Stop at point directly beneath place where beam illuminates cloud.

6. Distance paced off is the height of clouds, and is so reported.

If ceiling light is of the fixed type, that is, always points in the same direction, a series of distance markers should be placed along this line. Pacing the distance will then be unnecessary.

PRINCIPLE OF CEILING LIGHT

The method of the ceiling light is based merely on the fact that the hypotenuse or leg of a right-angle triangle having two equal sides makes an angle of 45° with both sides. The ceiling light is therefore tilted at an angle of 45° from the horizontal.

CARE OF CEILING LIGHT

See that it rotates freely and, if necessary, oil bearing. Keep glass door and reflector clean and inside of lamp dry.

IV. VISIBILITY (DAYTIME)

1. Look for selected objects at known distances from the observer. (See par. 2 under General Duties.)

2. Pick out farthest object you can recognize.

3. Write down its distance in visibility column on airway observer's weather report.

REPORTING VISIBILITY

In order to make the reports or messages brief, as well as to prevent confusion with other data, especially ceiling, report visibility to miles and fractions of miles, as indicated in the followng table:

Visibility, in terms of the distance to nearest prominent object visible

Recorded on airway observer's weather report	Given in report or message
⅛ mile or less	No visibility.
¼ mile	One-quarter mile.
½ mile	One-half mile.
¾ mile	Three-quarters mile.
1 mile	One mile.
2 miles, 3 miles, etc	Two miles, three miles, etc.
10 miles or more	Unlimited.

IV–A. VISIBILITY (NIGHTTIME)

1. Look for farthest beacon light or other light of known distance from the observer.

2. Record and report its distance according to rules given for daytime visibility.

V. WIND DIRECTION AND VELOCITY

1. Enter wind direction and velocity in column headed wind direction and velocity on airway observer's weather report. Use abbrevia-

tions for direction, such as N., NE., E., etc., and enter velocity in miles per hour.

WIND DIRECTION

The direction *from* which the wind is blowing is always used in these reports. This will be determined from a wind vane or wind cone, when available; otherwise, by observing the effects of the wind on various objects visible to the observer, or on the observer himself. Directions are recorded to eight points of the compass, viz, north, northeast, east, southeast, etc.

WIND VELOCITY

Wind velocity is recorded in miles per hour. Where instruments are furnished for the purpose, the equipment consists of a cup anemometer, electrically connected with a "buzzer" type of indicator. The velocity is determined by pressing a button on the buzzer box, and counting the number of buzzes in a minute.

EXPOSURE OF WIND INSTRUMENTS

The anemometer and wind vane should be exposed so that the support will be perfectly vertical, that is, the anemometer or wind vane should revolve in a horizontal plane; and the exposure high enough so that the instruments will be above any near-by structure or trees that would tend to interfere with the free movement of the wind at their level. In general, the higher the support, the better. The instruments should also be easily within reach, to permit occasional adjustments, oiling, and cleaning.

Figure 14 shows a Weather Bureau wind instrument equipment, consisting of anemometer, wind vane, and 7-foot steel support. Figure 15 shows the buzzer box connected to an anemometer. Where no wind vane is furnished, the cross arm is omitted, and the anemometer mounted directly on top of the main support. In some places where a wind vane is not needed, it will be satisfactory to use a so-called "post type" support for the anemometer. This consists merely of a short piece of brass, tapered at the top to fit into the lower hollowed end of the anemometer, and flattened at the bottom, where screw holes are provided to fasten the support to a suitable wooden post or staff. Where the exposure must be from an extensive roof, a support similar to that of Figure 14, but 18 feet high, should be used, in order that the instruments may be well above the influence of eddy currents that form about the roof. When the exposure can be made from the top of an open structure, like a beacon tower, then a support just short enough so that the observer can reach the instruments, can be improvised.

The anemometer should be connected to the buzzer box with any kind of weatherproof insulated copper wire of at least 16 or 18 gauge. Current is provided by two dry cells in the box. The buzzer should be attached to the wall or otherwise conveniently placed within the house or office.

OILING AND CLEANING ANEMOMETER

The upper and lower bearings of the spindle should be oiled once a week. The upper bearing is oiled by removing the cups, and the lower bearing and the spindle worm through the orifice provided, which must at all other times be kept closed to prevent dust entering the gears. A drop of oil, such as will generally adhere to a match or

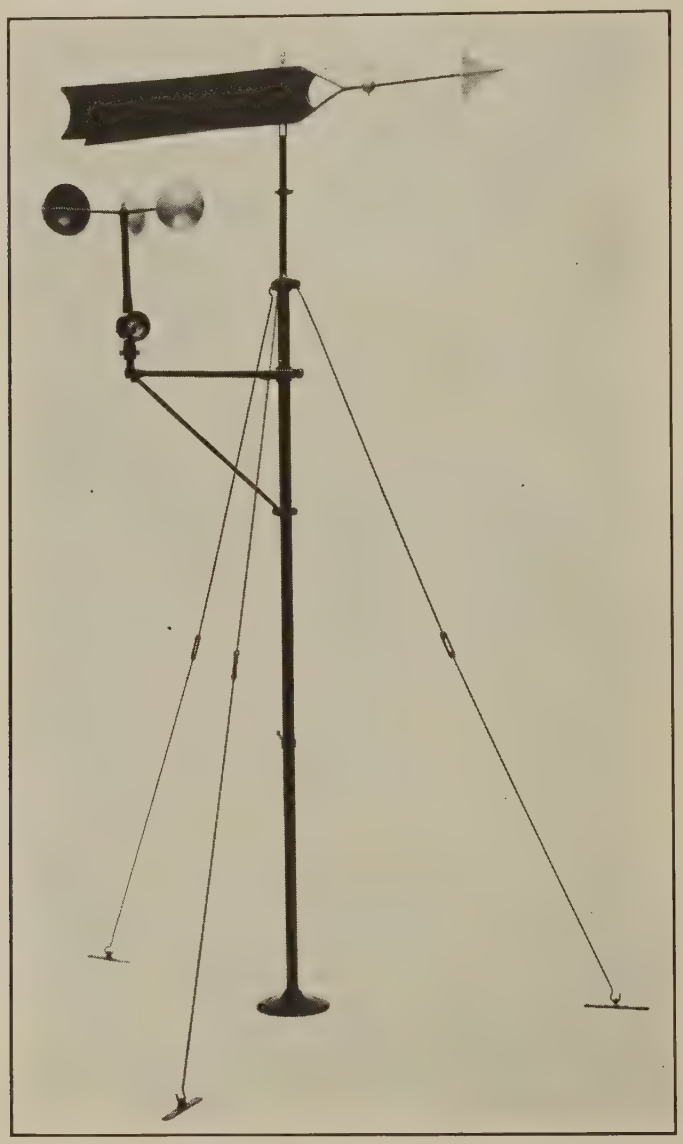

FIG. 14.—Weather Bureau 7-foot wind instrument support, with wind vane and anemometer

similarly pointed stick, applied once, is, in most cases, sufficient for the parts of the spindle. About once a month the anemometer should be taken down and cleaned. Only clean cotton (not cotton waste) or soft cloths should be used; the parts should be rubbed quite dry and clean, and all old oil removed thoroughly before any new oil is applied; a little kerosene or benzine is helpful in this connection. The train of gearing should then be also oiled, a drop being suffi-

cient for each bearing or friction surface. A very small quantity should then be placed upon the inclined face of the projection on the contact spring. Only the special clock oil provided should be used. The later types of anemometers have three cups instead of four, and are provided with an oil reservoir at the top for oiling the upper spindle bearing. When an anemometer is cleaned, this fact should be noted on the airway observer's weather report, preferably somewhere at the bottom.

OILING WIND VANE

Where a plain spindle bearing is used, this should be kept oiled, the wind vane occasionally removed, and the bearings cleaned of

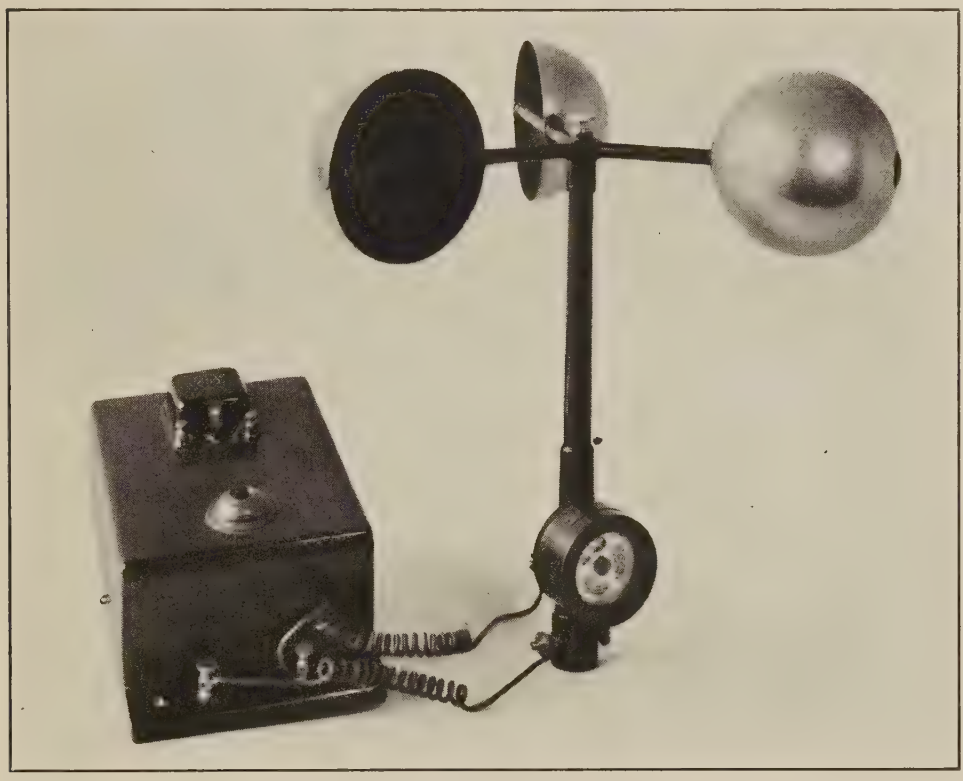

FIG. 15.—Anemometer and buzzer box

dirty oil and reoiled. Where roller bearings are used, a very little oil should be put on the axes of the rollers, but never on the surface upon which the wheels roll, or upon the wheels themselves, as this causes dust to adhere, and defeats the object of oiling. Where ball bearings are used, vaseline is the best material to use for lubricating them.

ESTIMATING WIND VELOCITY WITHOUT INSTRUMENTS

The following rules will aid in eistmating wind velocity by observing the effects of the wind on objects surrounding the observer:

Wind velocity equivalents

Descriptive word	Velocity, miles per hour	Specifications for estimating velocities
Calm	Less than 1	Smoke rises vertically.
Light	1 to 3	Direction of wind shown by smoke drift, but not by wind vanes.
	4 to 7	Wind felt on face; leaves rustle; ordinary vane moved by wind.
Gentle	8 to 12	Leaves and small twigs in constant motion; wind extends light flag.
Moderate	13 to 18	Raises dust and loose paper; small branches are moved.
Fresh	19 to 24	Small trees in leaf begin to sway; crested wavelets form on inland waters.
Strong	25 to 31	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.
	32 to 38	Whole trees in motion; inconvenience felt in walking against the wind.
Gale	39 to 46	Breaks twigs off trees; generally impedes progress.
	47 to 54	Slight structural damage occurs (chimney pots and slate removed).
Whole gale	55 to 63	Trees uprooted; considerable structural damage occurs.
	64 to 75	Rarely experienced; accompanied by widespread damage.
Hurricane	Above 75.	

VI. TEMPERATURE

1. Do not touch or remain long near the thermometer when taking a reading.

2. Write down number of degrees indicated at top of mercury column. If this number is below zero of the scale, record a minus sign (−) before the figures and report as "below zero."

3. If temperature is falling rapidly at time of observation, particularly in winter, note that fact under remarks on airway observer's weather report, and include as last words in your report.

EXPOSURE OF THERMOMETER

The thermometer should have a free exposure to the outdoor air, and at the same time be shielded from the direct rays of the sun or any artificial heat. Where shelters are provided, these should be erected about 4 feet above the ground with the door facing north. (See fig. 16.) Only when special "maximum" and "minimum" thermometers are furnished will they be exposed horizontally as shown in Figure 16. Ordinary thermometers, such as most airway observers will be furnished, must be exposed vertically, bulb end down. Where shelters are not provided, the thermometer should be hung on the north side of a building where it will be freely exposed to the circulation of the air, and shielded from the sun and rain or snow. As the thermometers provided by the Weather Bureau are very fragile, care should be taken that they are exposed where they

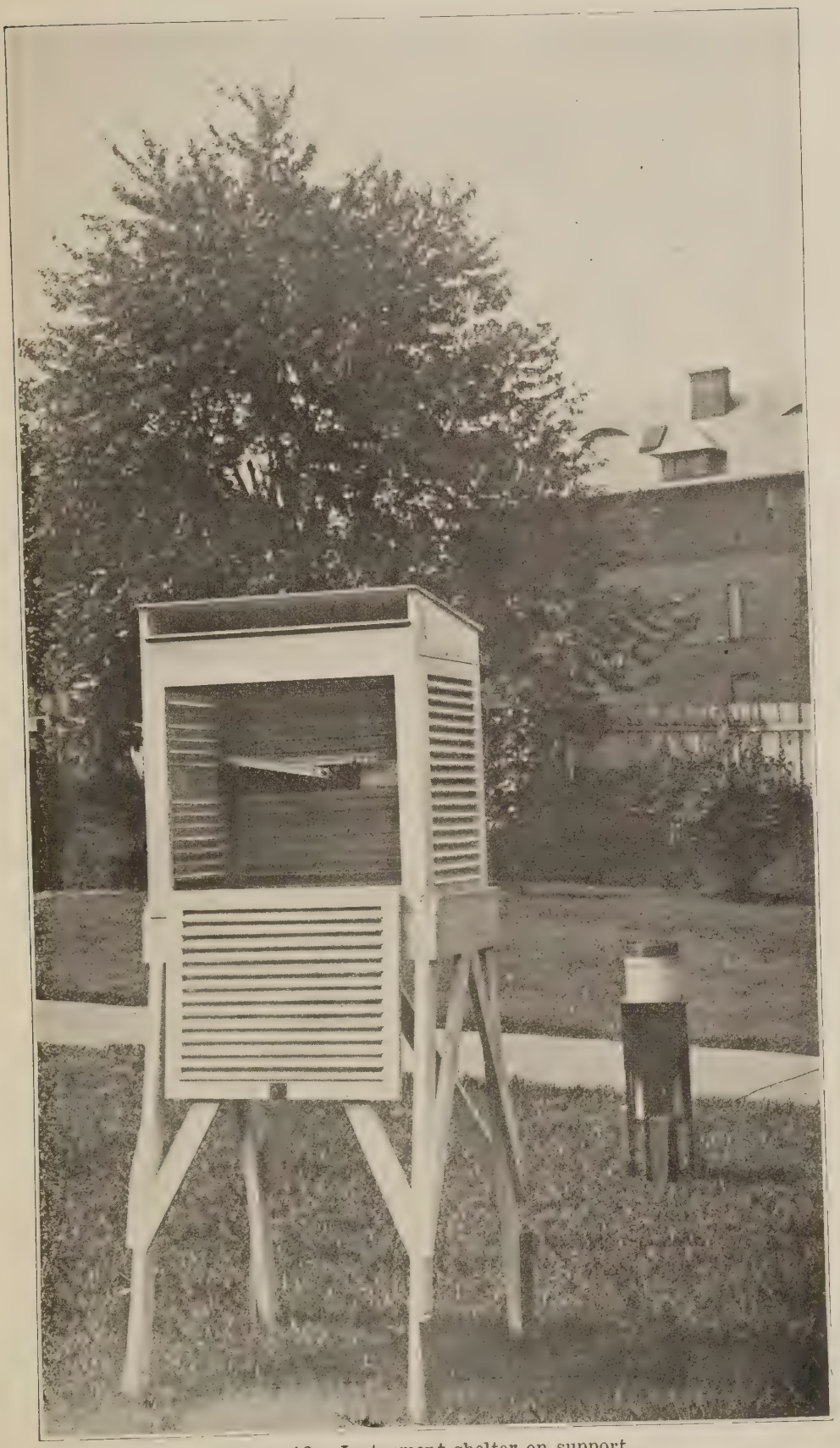

FIG. 16.—Instrument shelter on support

will be free from molestation of any kind and protected from animals or flying débris.

VII. BAROMETRIC PRESSURE

ANEROID BAROMETER

1. Hang or place barometer indoors where it will not be subject to extremes of heat and cold, or rapid changes in temperature, and especially where it is not likely to be jarred.
2. Before making a reading tap the face of the barometer very gently with the finger; this will take the needle to its true "settling point."
3. Write down reading of needle at scheduled time of making report. The entry should be in inches, tenths, and hundredths, thus: "29.52," "28.02," "30.00," etc.

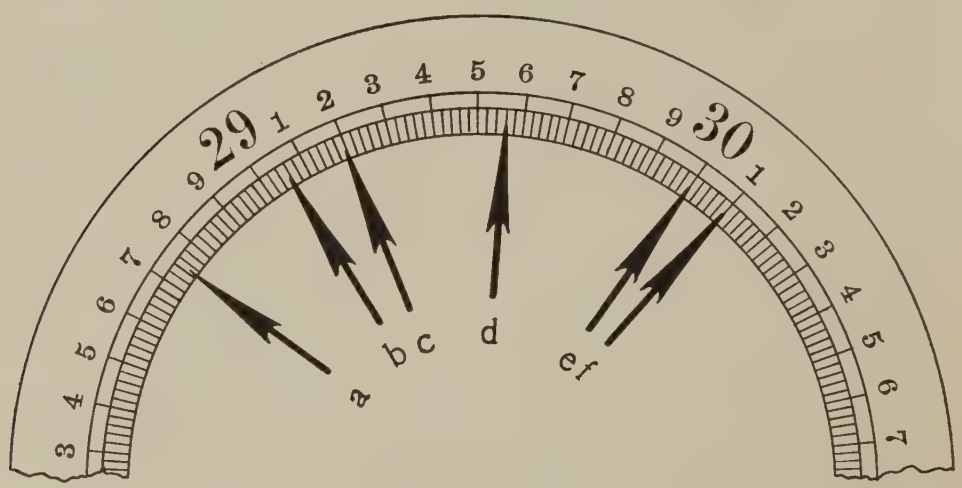

FIG. 17.—Illustrating six different readings of aneroid barometer

READING ANEROID BAROMETER

These instruments are usually graduated to every two-hundredths of an inch, and reading of them to hundredths is, therefore, easy. Care, however, should be taken not to confuse the tenths divisions with those for hundredths. Figure 17 is a reproduction of a portion of the dial of a common type of aneroid barometer, to which has been affixed a series of imaginary positions of the needle, marked "*a*," "*b*," "*c*," etc. The following are the correct readings corresponding to these positions:

a. 28.75 inches.
b. 29.06 inches.
c. 29.20 inches.
d. 29.56 inches.
e. 30.00 inches.
f. 30.10 inches.

DESCRIPTION AND CARE OF ANEROID BAROMETER

The essential feature of all aneroids is a small metallic box or cell, corrugated in order to make it flexible, and exhausted of air. The flexible corrugated surfaces, which tend to be collapsed by the pressure of the outside air, are forcibly held apart by the action of a

strong steel spring. As the pressure of the air changes, this cell contracts or expands, and this small movement of one side of the cell is magnified and transmitted to the needle through a train of links and a fine chain. The effects of temperature are compensated either by leaving a small quantity of air in the vacuum chamber, or by making one of the levers of two different kinds of metals. Figure 18 shows the internal construction of an aneroid barometer.

The aneroid is at times subject to a slow change or "creeping." It will, therefore, have to be adjusted occasionally by comparing its reading with a mercury barometer or another aneroid of known accuracy. This will be done by a meteorologist of the terminal station, who will either visit the airway station, carrying an accurate barometer with him for the purpose, or have the barometer shipped in to

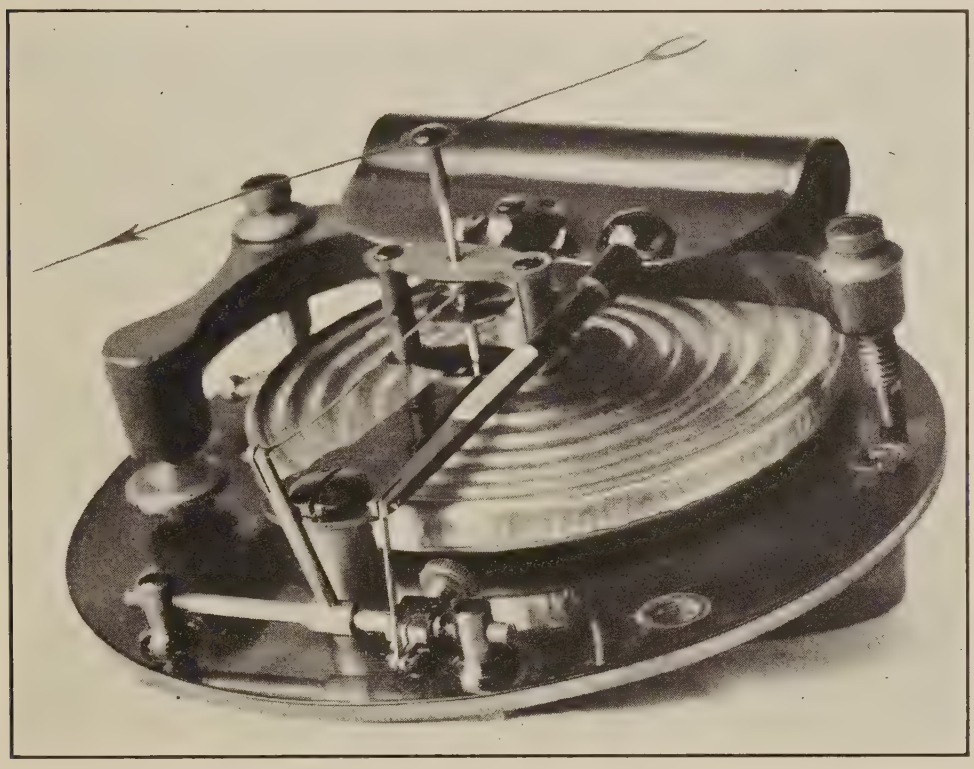

FIG. 18.—Aneroid barometer

him for adjustment. The airway observer should not attempt to make any adjustments, but if he suspects that the barometer readings are in error he should report the fact.

VIII. PRECIPITATION

MEASURING SNOWFALL

As stated in last paragraph under II (Observing general weather conditions), it is often desirable to know the amount of snow that has fallen since the previous observation, if the amount is heavy, i. e., more than a few inches. This information is valuable to the pilot, in that a heavy fall of snow contributes one of the hazards of landing. No special apparatus is needed to measure snowfall, it

being sufficient to take a stick of any kind ruled into inches, making a few measurements of the depth of the new snow lying on the ground, and striking an average. This average depth is recorded in whole inches under remarks on airway observer's weather report, and reported as the last words of the message.

REPORTING RAINFALL

For reasons similar to those given for reporting snowfall, it will often be desirable to record and transmit to the terminal station the amount of rain that fell since the previous observation, especially if it is heavy, principally, in order that the pilot may know the condition of the ground. Such reports will be of particular interest over regions where regular weather bureau stations are far apart, for which areas therefore, the daily weather maps made out at the terminal stations will often fail to show the occurrence of heavy local rains.

At stations not equipped with rain gauges, it will generally be sufficient to give as the last words of the report (irrespective of what is reported as "general condition" at time of observation) some statement such as "heavy rain last night," "heavy rain this morning," etc. For stations equipped with rain gauges, appropriate instructions will be found in another pamphlet, entitled "Instructions for Cooperative Observers."

IX. TELEPHONE

1. When radio operator or terminal station calls for report or you call operator or other person at terminal at a stated time, give location and read each column in rotation.
2. As soon as this report has been read back by radio operator or other recipient hang up the telephone receiver.
3. Write in last column number of minutes you were talking.
4. Make a written report to the supervising office if the telephone call took longer than three minutes.

X. TELEGRAPHIC REPORTS

1. Where reports are telegraphed to terminal use the regulation Weather Bureau telegraph forms and make out report in duplicate with carbon paper.
2. Forward carbon copies at end of month to the supervising office or such other office as may be especially designated to you.
3. Mark the messages "Paid Wea.," and in the check of words count address and signature.

FORM OF MESSAGES

There follow six specimens of telegraphic reports made out from the sample copy of airway observer's weather report published in the back of this pamphlet. The first is a complete message, while the remaining five are in each case a reproduction of the body of the message only. In order to prevent confusion of figures the word "temperature" should be inserted after the velocity word

and the word "barometer" after the temperature word. For barometer readings less than ten-hundredths of an inch the word "naught" should be inserted after the whole inches, thus: 30.06 should be expressed as "thirty naught six."

Filed 6:00 A. M.

21 Paid Wea.

Station _____

January 29, 1928.

AIR MAIL FIELD,
Chicago, Ill.

Clear ceiling and visibility unlimited southeast thirteen temperature thirty one barometer twenty nine fifty six.

SMITH.

(January 30, 1928, 2 P. M.)

Broken clouds three thousand feet one mile northeast twenty temperature forty one barometer thirty naught four clearing rapidly.

(January 31, 1928, 3 P. M.)

Heavy rain five hundred feet one half mile southwest eighteen temperature forty two barometer twenty nine ninety nine severe thunderstorm.

(February 2, 1928, 6 A. M.)

Scattered clouds ceiling unlimited eight miles west fifteen temperature four below zero barometer thirty naught one.

(February 3, 1928, 6 A. M.)

Dense fog no ceiling no visibility northeast seventeen temperature thirty eight barometer twenty nine ninety one rainfall three inches.

(February 4, 1928, 3 P. M.)

Heavy snow seven hundred one quarter mile north twenty four temperature thirty barometer twenty nine eighty eight snowfall five inches.

XI. SPECIAL DUTIES

Once each week after recording the last observation for Sunday, mail copies of airway observer's weather report, as directed in separate instructions. Use official, franked, addressed envelopes furnished for this purpose. Do not use these envelopes for any other than official purposes.

REPORTING BROKEN OR DEFECTIVE INSTRUMENTS

When from any cause instruments are broken or lost, report of that fact will immediately be made to the Weather Bureau office under whose supervision the work is carried on. Instruments that are suspected of being defective, should likewise be reported. Ordinary precautions are required in the use of instruments, and observers are requested to use every reasonable care to avoid accidents, breakage, and loss.

AIRWAY OBSERVER'S WEATHER REPORT

Station_____
Month and year, January–February, 1928

Date	Time	General condition	Ceiling	Visibility	Wind direction and velocity	Temperature	Barometer	Remarks	Telephone
1928	*A. m. or p. m.*		*Feet*	*Miles*		°*F.*	*Inches*		*Minutes*
Jan. 29	6 a. m.	Clear		12	SE.–13	31	29.56		2
29	2 p. m.	Overcast	900	6	NW.–16	38	29.64	Lightning in northwest.	3
30	6 a. m.	Light rain	700	1	E.–10	40	29.88		2
30	2 p. m.	Broken clouds.	3,000	1	NE.–20	41	30.04	Clearing rapidly	2
31	6 a. m.	Scattered clouds.		15	SW.–8	39	30.11		2
31	3 p. m.	Heavy rain.	500	½	SW.–18	42	29.99	Severe thunderstorm	3
Feb. 1	7 a. m.	Rain and hail.	600	¼	S–9	43	29.86		2
1	2 p. m.	Broken clouds.	1,200	4	SW.–12	48	29.92		2
2	6 a. m.	Scattered clouds.		8	W.–15	44	30.01		2
2	2 p. m.	Clear		18	W.–11	50	30.03		2
3	6 a. m.	Dense fog	None.	1/10	NE.–17	38	29.91	Rainfall, 2.96 inches	3
3	2 p. m.	Overcast	800	2	NE.–20	40	29.88	Thunderstorm north of station, passing to east.	3
4	6 a. m.	Freezing rain.	900	½	NE.–19	28	29.86		2
4	3 p. m.	Heavy snow.	700	¼	N.–24	30	29.88	Snowfall, 5 inches	3
								Anemometer cleaned, Jan. 31.	

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